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SENSATION SEEKING AND THE ENJOYMENT OF STRUCTURE AND CONTENT OF HUMOUR: STABILITY OF FINDINGS ACROSS 4 SAMPLES. ^{1*}

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Summary—The role of sensation seeking in the realm of enjoyment of humour was investigated. It was hypothesized that the personality trait sensation seeking (SS) is able to predict both, the structure and content of jokes and cartoons. Seven hypotheses were derived and tested for four samples comprising a total of 448 Ss. The hypotheses were related to both components in appreciation of humour, funniness (representing the positive feelings induced by humour) and aversiveness (representing the negative feelings). Experience Seeking (ES) and Boredom Susceptibility (BS) were predictive of low appreciation of humour in which the punchline is mildly surprising and the surprise can easily be overcome by resolving the incongruity (i.e. incongruity- resolution humour). Furthermore, ES and BS were predictive of funniness and (low) aversiveness of humour in which the punchline is largely unpredictable and the incongruity can only partly be resolved or not resolved at all (i.e. nonsense humour). Disinhibition (DIS) was correlated with funniness and (low) aversiveness of sex humour. These correlations were especially high when the sexual content was embedded in the nonsense structure and when DIS was related to an index representing the content of humour only. Sensation seekers yielded lower aversiveness ratings to nonsense and sex humour whereas low Disinhibition appeared to represent the tendency to find all kinds of humour aversive.

INTRODUCTION

The realm of appreciation of humour has received an increasing amount of theoretical and empirical attention over the past decades. Recent empirical and theoretical advances are discussed in the Handbook of Humor Research (McGhee and Goldstein, 1983) which was edited in two volumes. However, it included no chapter on individual differences. Research in individual differences in humour is suffering from several weaknesses. For example, research was seldomly conducted within the framework of theoretical humour models. Hypotheses originated from the knowledge about the trait under investigation but neglected the results of the humour research. Very seldomly, accepted parameters originating from humour research were used to link the trait with appreciation of humour. Usually, A priori humour categories (most often based on the Freudian trilogy, sexual, aggressive and harmless jokes) were used, which lacked in a theoretical background and/or in empirical testing of its homogeneity. Another characteristic of these studies was the overestimation of the importance of the content of humour at the expense of its structural properties.

^{1*} This paper is partly based on data presented at the 3rd Meeting of the ISSID, Toronto, Canada, 18-22 June, 1987.

Recent theoretical humour models (e.g. Suls, 1983; Shultz, 1976) pay more attention to the processing of humour. Two structural parameters are considered to be essential ingredients in all kind of humour: incongruity, which is usually induced by the punchline and the resolution of that incongruity. Factor analytic investigations of humour appreciation (e.g., Ruch, 1981, 1984; Ruch and Hehl, 1986b) have underlined the importance of these two parameters by revealing that the two main factors are related to the structure of the jokes and cartoons and not to their content. In fact, in our studies, only sex humour appeared as a "content" factor. In order to control the invariability of our results we used different, partly overlapping samples of humour and subject samples differing with regard to sex, age, health status, and nationality (Austrian and German Ss). Recently, these three factors were replicated in a French sample (Accoce, Ott, Bariaud, Rodriguez-Tome and Ruch, 1987) using a French translation of the humour test.

The most powerful structure factor (incongruity-resolution humour) consists of jokes and cartoons in which the surprising incongruity can be resolved completely. In nonsense humour, the other structural factor emerging consistently, there is generally a surprising or incongruous punchline, exactly as in incongruity-resolution humour. However, "... the punchline may 1) provide no resolution at all, 2) provide a partial resolution (leaving an essential part of the incongruity unresolved), or 3) actually create new absurdities or incongruities. Pien and Rothbart (1976; Rothbart and Pien, 1977) have similarly stressed that resolution information often gives the appearance of making sense out of incongruities without actually doing so." (McGhee, Ruch and Hehl, 1987).

Factor analysis was also used to investigate the dimensionality of the responses to humour (Ruch, 1981). Appreciation of humour is defined by two almost orthogonal components: 'funniness' and 'aversiveness' (in former studies called 'rejection').

Individual differences in appreciation of structural properties of humour

In predicting individual differences in appreciation of humour based on the incongruity-resolution (INC-RES) structure used the analogy between resolution of incongruity and the more general principle of reduction of uncertainty. We hypothesized that the reduction of uncertainty (which occurs in jokes through the resolution of the incongruity) is experienced as more pleasurable by Ss generally disliking uncertainty (in the sense of information theory; e.g. novelty, complexity, ambiguity, incongruity, unsolvability). Avoiding stimulus and response uncertainty is an essential ingredient of personality concepts like intolerance of ambiguity (Frenkel-Brunswik, 1949) and conservatism (Wilson, 1973). Thus, conservative and ambiguity intolerant Ss should find humour in which it is possible to resolve the incongruity more pleasurable and unresolvable humour more aversive than liberals and ambiguity tolerant Ss. In fact, funniness of jokes based on the INC-RES structure was consistently positively correlated across different samples with different measures of intolerance of ambiguity (Accoce et al., 1987; Ruch and Hehl, 1983, 1985, 1986a) and conservatism (Joachim, 1986; Rath, 1983; Ruch, 1984; Ruch and Hehl, 1985, 1986a). Variables closely related to these two concepts (e.g. superego strength, rigidity, low imaginativeness, intolerance of minorities, inhibition of aggression, or militarism) were predictive of funniness of INC-RES humour as well, albeit to a smaller extent (Ruch and Hehl, 1985).

The prediction of appreciation of nonsense (NON) was less successful. We tested predictors from the personality domain but also from the realm of attitudes and abilities. In a fairly representative sample of adults fluid intelligence (Cattell's CFT-3) correlated significantly with funniness (positively) and aversiveness (negatively) of nonsense humour. Furthermore, the closure factor of intelligence correlated positively with funniness of

nonsense in two student samples (Ruch and Hehl, 1985). Intolerance of ambiguity and conservatism were powerful in predicting aversiveness of nonsense humour but not in predicting its funniness. The typical magnitude of correlation between funniness of nonsense humour and conservatism was -0.20; the significance depending on the size of the sample. Both concepts, intolerance of ambiguity and conservatism are conceptually unipolar and emphasize the uncertainty avoiding aspect. For predicting appreciation of nonsense variables are needed which emphasize the opposite pole, i.e. the uncertainty seeking aspect. Thus, it is hypothesized that nonsense is preferred by Ss who generally appreciate complex and incongruent stimuli; not limited to the realm of humour. Sensation seeking (Zuckerman, 1979) seems to fulfil these requirements. The present paper investigates the role of sensation seeking in the realm of enjoyment of humour.

Theoretical links between humour and sensation seeking and derivation of the hypotheses

The trait of sensation seeking (SS) has been defined as

"the need for varied, novel and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experience." (Zuckerman, 1979, p. 10).

Sensation seeking as a predictor of the structure of humour

This definition of SS offers several links with structural properties of humour. Jokes and cartoons of the two factors differ with regard to many collative (Berlyne, 1972) variables. It is hypothesized, that nonsense (NON) humour offers more stimulation than incongruity-resolution (INC-RES) humour in both the incongruity as well as in the resolution stage. One difference refers to the complexity of the incongruities. Usually there is a single incongruity in INC-RES humour whereas in the absurd NON cartoons there are frequently multiple incongruities. Generally, there is more deviation from reality and challenge for the recipient's fantasy through NON humour; e.g. by making use of strange situations, odd characters, improbable, phantastic events and unlikely behaviours. The degree of predictability of the incongruous punchline differs in the two types of humour. It is impossible to predict the punchlines of NON humour since absurd things happen which usually do not occur in reality and hence are unpredictable. In INC-RES humour the punchline is in some cases easy to predict. Occasionally, the characters appearing in this humour are known; they are prototypes of certain ethnic groups or social roles or classes or institutional figures (e.g. the mother-in-law, homosexuals, judge and delinquent). These characters most often behave in a stereotypical manner which can be inferred from knowing the stereotypes or other jokes representing variations of the same theme. Thus, it is likely that one is less surprised by the incongruity of INC-RES humour. Another difference relates to the technique used to construct the incongruity; incongruities in INC-RES humour are misexpected whereas the incongruities in NON humour are unexpected.

Differences in the resolution stage are due to different degrees of solution obtained. Incongruities of INC-RES humour can be resolved completely whereas NON humour offers either no resolution of the incongruity, incomplete resolutions, or resolutions which introduce new incongruities. Thus, in NON humour the recipient is always left with some residual puzzlement whereas in the INC-RES humour the surprise is completely overcome. In INC-RES humour a resolution "exists". Sometimes one only has to apply a rule which is already known to the recipient which refers to the habits, traits, or motives attributed to the characters involved. When incongruities of NON humour are solvable they are so in a new,

unconventional, phantastic way. The resolutions in NON humour force the recipient to activate his phantasy and imagination more than INC-RES humour does. In a recent study (Joachim, 1986) Ss claimed to "understand" 98.1% (worst single item: 89%) of the INC-RES jokes and cartoons of our humour test whereas only 89.1% (worst single item: 67.1%) of the NON items were "understood". An investigation by Rath (1983) showed that although INC-RES and NON humour were regarded as equally funny the latter were perceived as more perplexing. Furthermore, funniness and perplexity were highly correlated in NON humour ($r = 0.54$, $P < 0.001$, $d.f. = 98$) but not in INC-RES humour ($r = 0.15$).

Given the proposed differences in the stimulus arousal potential of the two categories of humour we can formulate three general hypotheses relating to the structure of humour: SS correlates positively with funniness of NON humour (Hypothesis 1) and correlates negatively with funniness of INC-RES humour (Hypothesis 2). Furthermore, the low sensation seeker will be afraid of the complexity and unsolvability of NON humour; suggesting a negative correlation between sensation seeking and aversiveness of NON (Hypothesis 3).

Since the Sensation Seeking construct is multidimensional in its nature, we have to take the differences in the subfactors into account.

Thrill and Aventure Seeking (TAS) represents the desire to seek sensation through risky sports or activities that produce unusual sensations such as parachuting or scuba diving.

Experience Seeking (ES) involves seeking of stimulation through the mind and the senses, through art, travel, even psychedelic drugs, music and the wish to live in an unconventional style.

Disinhibition (DIS) describes the seeking of sensation through drinking, partying, gambling and sexual variety. Items of this scale indicate seeking of stimulation through other persons; they express a need for variety in social life and other hedonic pursuits.

Boredom Susceptibility (BS) items indicate a high aversion to boredom produced by the absence of stimulation from activities or other persons and restlessness as a reaction to boredom (Zuckerman and Litle, 1986, p. 51).

The different subfactors relate differently to different aspects of stimulation. Zuckerman (1984) suggests that ES might be more closely related to the novelty and complexity dimension of stimuli. ES has proven to be the best predictor (among the SS subscales) of appreciation of different aesthetic objects (including different music styles, designs, or semi-abstract art) which differ with regard to collative variables (Little and Zuckerman, 1986; Zuckerman, 1979). Furthermore, ES produces consistently the highest negative correlations of all the SS-Scales with conservatism and intolerance of ambiguity, the most potent predictors of humour hitherto found (Zuckerman, 1979; Glasgow, Cartier and Wilson, 1985). Therefore, the three hypothesis will be mainly connected with ES; i.e. is expected to be the strongest predictor of appreciation of the structural properties in humour.

BS represents the tendency to avoid repetitive experience and thus might be related differently with the humour categories too. The need for seeking novelty and avoiding repetition will result in enhanced appreciation of the more phantastic and unconventional nonsense humour and low appreciation of INC-RES humour using repetitive stereotypical resolution schemata. Therefore, the three general hypotheses are applied to the BS subscale too.

Sensation seeking as a predictor of the content of humour

Zuckerman (1984) suggested that DIS relates to the intensity dimension of stimulation. Sexual content represents one of the most intensive stimulation obtainable in humour. It is assumed, that high disinhibitors tolerate stimulation by highly tendentious humour as they tolerate intensive stimulation by other objects (Little and Zuckerman; 1986). Recently, we

showed that the dimension 'tough-/tendermindedness' is responsible for the preference of content of humour regardless of its structure (Ruch and Hehl, 1986b). Tough Ss rated sex jokes and cartoons as funnier and considered them less aversive than tender Ss. Separation of the sex category into INC-RES SEX humour and NON SEX humour revealed that this effect can be found with sex humour based on both structures. Since DIS is a marker variable of toughmindedness, Hypothesis 4 expects that DIS will correlate positively with funniness of the sex category and negatively with its aversiveness.

Separation of sex jokes and cartoons according to their structure

The sex category decomposes into three correlated clusters of items according to the items loading on the structure factors. INC-RES SEX and NON SEX jokes and cartoons have a second loading on the incongruity-resolution respectively the nonsense factor, whereas in PURE SEX humour the variance due to the structure is negligible. There is evidence, that content and structure of humour have additive influence on its perceived funniness (Ehrenstein and Ertel, 1978; Ruch and Hehl, 1986b; Wilson, 1979). In NON SEX humour the two arousing properties are combined, the NON structure and the sexual content. This mixture is expected to be the most intensive stimulation represented in the present list of humour and thus most highly positively correlated with DIS followed by PURE SEX (Hypothesis 5). In INC-RES SEX humour the sensation seekers high appreciation of the content might be suppressed by their low appreciation of the INC-RES structure; this might yield a zero-correlation.

Sensation seeking as a predictor of aversiveness of humour

Humour generally needs to be processed in a cheerful and nonthreatening frame of mind. If this context no longer is given, the recipient "leaves the field" (i.e. he stops processing). This might be due to reasons of intolerable content (which is often the case in tendentious humour) or disliked structural properties (i.e. too simple or too complex jokes). The recipient considers the joke aversive (with different qualities like embarrassing, painful, boring, or silly). It can be assumed, that sexual content as well as collative variables in NON humour represent too intensive stimulations for the low sensation seeker; i.e. sensation seeking will be negatively correlated with aversiveness of the sex and nonsense categories; and especially highly so with aversiveness of NON SEX humour (Hypothesis 6). Since INC-RES humour is of low stimulative value there is no reason to expect that they will be aversive for the low sensation seeker. INC-RES humour might be boring for the high sensation seeker but it is doubtful, whether this results in high aversiveness ratings. Since tendermindedness emerged to be a predisposition to experience all humour categories aversively (Ruch and Hehl, 1986b) Hypothesis 7 predicts a negative correlations between DIS and the three aversiveness scales.

METHOD

Subjects

Four samples were employed. Sample 1 consists of 59 male and 56 female non-psychology students. Their age ranged between 18 and 32 years with a mean of 22.6 yr and a standard deviation of 3.0 yr. Sample 2 consisted of 68 male non-psychology students in the

age between 20 and 31 years with a mean of 24.3 yr and a standard deviation of 3.0 yr. Sample 3 was collected in Austria and consisted of 80 male and 80 female school teachers from different schools in Styria. Their age ranged between 18 and 55 yr with a mean of 27.9 yr and a standard deviation of 8.4 yr. Sample 4 consisted of 49 male and 56 female Ss, about half of them were psychology students of introductory courses. Their age ranged between 18 and 41 yr with a mean of 24.7 yr and a standard deviation of 5.5 yr. Their data were used in a recent publication (Hehl and Ruch, 1985) for locating humour in a comprehensive personality space and will be reanalysed here.

Material

Among other personality questionnaires, Ss answered a German translation (Unterweger, 1980) of the SSS-IV (Zuckerman, 1979) and different forms of the humour test (Ruch and Hehl, 1985). The humour tests consist of jokes and cartoons (50 in Form K; 35 each in Forms A and B) which are rated on 2 unipolar 7-point scales for "funniness" and "aversiveness". The aversiveness scale covers negative reactions like indignation, embarrassment, or boredom. Six scores can be derived: three for funniness of incongruity-resolution-, nonsense- and sex humour (i.e. INC-RESf, NONf, and SEXf) and three for their aversiveness (i.e. INC-RESa, NONa, and SEXa). Samples 2 and 3 answered the 3WD-K, samples 1 and 4 filled in the 3WD-A and 3WD-B; the scores of both forms were combined.

RESULTS

Product-moment correlations between the humour test and the sensation seeking scales were computed separately for the 4 samples and combined. For the latter case the humour scales were corrected for differences in length. Although hypotheses were formulated, we applied only two-tailed tests of significance in order to avoid confusion.

The correlation between funniness of nonsense and TAS found by Hehl and Ruch (1985) was replicated in one of the samples (see Table 1). TAS and the three aversiveness scales correlated consistently negatively but not throughout significant. TAS was the only sensation seeking subscale which correlated overwhelmingly positively with INC-RESf.

Table 1. Correlations between the Funniness and Aversiveness of the three humour categories and the sensation seeking subscales TAS (Thrill and Adventure Seeking), ES (Experience Seeking), DIS (Disinhibition), and BS (Boredom Susceptibility) and the SS Total scale computed separately for the 4 samples and combined

	INC-RESf	NONf	SEXf	INC-RESa	NONa	SEXa
<u>TAS</u>						
Sample 1	0.14	-0.08	0.14	-0.19*	-0.11	-0.23*
Sample 2	0.15	0.24*	0.21	-0.13	-0.14	-0.14
Sample 3	-0.14	-0.01	0.06	0.04	-0.01	-0.15
Hehl & Ruch (1985)	0.13	0.22*	0.16	-0.20*	-0.38***	-0.27**
Samples 1-4	0.02	0.09	0.11*	-0.09	-0.13**	-0.17***
<u>ES</u>						
Sample 1	-0.13	0.19*	-0.04	0.05	-0.19*	-0.08
Sample 2	-0.24*	0.27*	-0.02	0.09	-0.18	-0.12
Sample 3	-0.16*	0.15	0.08	-0.05	-0.16*	-0.23**
Hehl & Ruch (1985)	-0.20*	0.09	-0.04	-0.14	-0.33***	-0.29**
Samples 1-4	-0.24***	0.20***	-0.03	0.01	-0.22***	-0.15**

DIS

Sample 1	-0.07	0.11	0.24*	-0.21*	-0.30**	-0.41***
Sample 2	-0.22	0.02	0.06	-0.30*	-0.34**	-0.37***
Sample 3	-0.20*	-0.05	0.35***	-0.04	-0.04	-0.37***
Hehl & Ruch (1985)	-0.14	0.16	0.12	-0.06	-0.28**	-0.34***
Samples 1-4	-0.18***	0.07	0.20***	-0.11*	-0.20***	-0.36***

BS

Sample 1	-0.20*	0.19*	-0.04	0.00	-0.25**	-0.16
Sample 2	-0.16	0.22	0.10	-0.01	-0.04	-0.10
Sample 3	-0.19*	0.07	0.01	0.00	-0.16*	-0.23**
Hehl & Ruch (1985)	-0.21*	0.08	0.00	-0.07	-0.24*	-0.26**
Samples 1-4	-0.23***	0.15**	-0.02	0.01	-0.22***	-0.15**

Total SS

Sample 1	-0.08	0.14	0.10	-0.12	-0.28**	-0.30**
Sample 2	-0.14	0.24*	0.11	-0.11	-0.23	-0.23
Sample 3	-0.23**	0.06	0.17*	-0.02	-0.13	-0.33***
Hehl & Ruch (1985)	-0.12	0.19*	0.09	-0.17	-0.43***	-0.39***
Samples 1-4	-0.20***	0.17***	0.08	-0.06	-0.25***	-0.28***

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

ES and BS revealed similar patterns of correlation with the humour scales in the different samples (see Table 1). ES and BS correlated negatively with INC-RES_f and positively with NON_f in each of the 4 samples; most of these correlation were also significant. ES and BS did not predict aversiveness of INC-RES humour but did predict aversiveness of nonsense and sex humour.

DIS correlated generally negatively with the aversiveness scores; the resulting coefficients were especially high for SEX_a and NON_a (see Table 1). Thus, Hypothesis 7 was supported. DIS correlated negatively with funniness of INC-RES humour in one sample and in the total group. DIS was also throughout positively correlated with SEX_f supporting Hypothesis 4. However, disappointingly, the correlations were significant in only two out of four samples and in the total group. Furthermore, the coefficients were of a lower size than expected. On the other hand, it was surprising, that there existed significant correlations at all since SEX_f and INC-RES_f were very highly positively intercorrelated themselves (between 0.66 and 0.85 in the present study). Therefore, one would expect that they correlate with a third variable with an identical sign. The high correlation between SEX_f and INC-RES_f respectively NON_f is due to the fact that sex humour is based on one type of structure or the other. Thus, the significant positive correlation between DIS and sex humour and a significant negative correlation between DIS and INC-RES humour has to be interpreted in this sense.

Hypothesis 5 predicted that DIS will be most highly correlated with appreciation (funniness and aversiveness) of NON SEX humour; i.e. humour in which structure as well as content contribute to the humour arousal potential. In order to test this hypothesis the jokes and cartoon of the sex category were separated according to their structure into those which were relatively pure (PURE SEX; 11 items), those which had a high second loading on Factor 1 (INC-RES SEX; 6 items) or on Factor 2 (NON SEX; 3 items). Their funniness and aversiveness scores were correlated with the sensation seeking scales. In order to save space only the results for sample 1 are shown (see Table 2).

Table 2. Correlations between the Funniness and Aversiveness of the three subtypes of sex humour (INC-RES SEX, NON SEX, and PURE SEX) and the sensation seeking scales in sample 1

	INC-RES SEX _f	NON SEX _f	PURE SEX _f	INC-RES SEX _a	NON SEX _a	PURE SEX _a
TAS	0.14	0.00	0.15	-0.22*	-0.11	-0.24**
ES	-0.10	0.16	-0.05	0.00	-0.18*	-0.08
DIS	0.15	0.35***	0.20*	-0.31***	-0.41***	-0.41***
BS	-0.13	0.17	-0.05	-0.06	-0.30**	-0.15
Total	0.02	0.23*	0.09	-0.20*	-0.33***	-0.30**

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table 2 shows that SS was most highly correlated with NON SEX humour, followed by PURE SEX and INC-RES SEX. This result emerged very clearly for DIS (as predicted by Hypothesis 5) but not for TAS. It can be seen, that structural properties contributed to appreciation of sex humour too. INC-RES SEX humour and INC-RES humour were similar with respect to their profile of correlations with the SS scales; so were NON SEX humour and NON humour. The profile of PURE SEX humour remained comparable to that of the total sex category. This correspondence can be observed for both, the funniness as well as the aversiveness scores. Furthermore, the separation of sex humour according to their structure also revealed significant correlations of ES and BS with aversiveness of NON SEX humour; the correlations with the funniness scales just fails to reach the level of significance in two-tailed tests. This effect can be attributed to the nonsense structure underlying NON SEX humour (which was predicted by ES and BS) since the correlations between ES and BS with PURE SEX_a and INC-RES SEX_a were nonsignificant and those with PURE SEX_f and INC-RES SEX_f were even of the opposite sign. Finally, TAS was correlated with INC-RES SEX_a and PURE SEX_a but not with NON SEX_a; this pattern of results replicated the correlations of TAS which were significant for INC-RES_a and SEX_a but not for NON_a.

Tables 1 and 2 give some further evidence that structural and content properties exist in sex humour and that their additive effects can be revealed in their correlations with external variables like sensation seeking. The sensation seeker's appreciation of sex humour is enhanced if the content is embedded in a nonsense structure and reduced if the content is embedded in an INC-RES structure. In other words, the correlations between SS and appreciation of sex humour rise if the content is based on nonsense and fall if the content is based on INC-RES structure. More precisely, Hypotheses 4 predicted a positive correlation between DIS and funniness of the content of sex humour suggesting that the variance due to the structure had to be removed in order to test this hypothesis more adequately. Partial correlations were calculated in order to eliminate the effects of the structure (represented by the INC-RES_f and NON_f scales).

Table 3. Correlations between Funniness of sexual humour (SEX_f) and Disinhibition (Col 1), corrected for the effects of INC-RES_f (Col 2), NON_f (Col 3) and INC-RES_f and NON_f combined (Col 4) computed separately for the 4 samples and combined

	SEX _f	Variables partialled out		
		INC-RES _f	NON _f	INC-RES _f ; NON _f
sample 1	0.24*	0.38***	0.22*	0.37***
sample 2	0.06	0.34**	0.06	0.32**
sample 3	0.35***	0.48***	0.41***	0.49***
sample 4	0.12	0.33***	0.04	0.28**
sample 1-4	0.20***	0.39***	0.19***	0.37***

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Column 1: d.f. = $n-2$; columns 2-3: d.f. = $n-3$; column 4: d.f. = $n-4$.

Since most of the sex jokes were based on the INC-RES structure, it could be expected that controlling the effects of INC-RES_f should affect the correlation between DIS and SEX_f more than controlling the effects of NON_f. Both variables were partialled out separately and combined. The results are presented in Table 3 (col 2 to 4). For the most part the correlations increased largely and all were significant once the effects of the structure were removed. Partialling out the effects of INC-RES greatly increased the correlations but partialling out the effects of nonsense did not affect the size of the correlations.

Finally, the SS total scale reflected the pattern of correlations of the single scales (see Table 1). Low sensation seekers tended to find nonsense and sex jokes more aversive than high sensation seekers. With regard to the funniness aspect in appreciation of humour the results were very clear albeit the obtained correlations were small. Sensation seeker tended to appreciate nonsense and sex jokes and evaluated INC-RES jokes as less funny. However, appreciation of humour tends to be more related with the subcomponents of sensation seeking than with the total scale.

Thus, Hypotheses 1 to 7 were supported by the data. However, the small size of the correlations regarding the structural components is surprising and has to be discussed. Firstly, there might be nonlinear relationships between SS and humour. Secondly, SS might determine the type of humour one enjoys and not so much the extent of enjoyment. These two possibilities will be examined next

Curvilinear relationship?

The product-moment correlation calculated so far took only linear relationships into account. It might be, that curvilinear relationships between SS and appreciation of humour exist. For example, it might be that for the high sensation seeker even nonsense humour does not provide enough arousal potential. In such case, nonsense would be appreciated most by Ss lying above the mean but not at the extreme of the SS scale; suggesting an inverted U-relationship. In order to get a rough estimation of nonlinear effects we divided the Ss into 5 groups (e.g. DIS--, DIS-, DIS+-, DIS+, and DIS++) according to their location on the corresponding scale and calculated analyses of variance with the SS-Scales as independent and the funniness and aversiveness scores as dependent variables. Subsequently, trend analyses were performed to test linear, quadratic and cubic relationships; 4-th order polynomials were not regarded to make sense. In order to obtain stable results and because of the small sample size in one of the samples we used the total sample only. Sex differences

were taken into account in the beginning but turned out to be of minor importance and were subsequently dropped from the analyses.

Significant main effects with dominant linear trends appeared in each (except one) of the cases where the correlations have been significant too. Only the main effect of TAS on NONa failed to reach significance. Two analyses revealed significant nonlinear effects where linear correlations indicated no relationship; an inverted U-form relationship (quadratic trend; $P < 0.01$; accounting for 76.6% of the variance explained by the main effect) between the total scale and INC-RESa and a cubic relationship ($P < 0.01$; 59.6%) between DIS and NONf. The total scale had a further significant quadratic effect on NONf ($P < 0.05$; 16.0% of the variance) where also the linear trend appeared ($P < 0.001$; 88.7% of the variance). Orthogonal to the linear trends further significant cubic effect of DIS emerged in the analysis of INC-RESf ($P < 0.05$; 26.4%; decreasing linear trend: $P < 0.001$; 63.2% of the variance) and SEXf ($P < 0.01$; 38.3%; increasing linear trend: $P < 0.001$; 52.3% of the variance). This effect was mainly caused by the DIS- and DIS+ groups, the former rated each of the 3 humour categories very funny whereas the latter rated them low in funniness. There is some evidence that these three cubic trends might be attributed to the structure because an index (SEXf minus a weighted sum of INC-RESf and NONf) serving as a rough estimation of appreciation of the content of sex humour yielded a highly significant ($F = 41.08$, $P < 0.001$) linear trend which accounted for 91.0% of variance of the main effect in an analysis of variance with no higher order effect being significant.

Minor but significant cubic trends were found in the effects of BS on INC-RESf ($P < 0.05$; 10.6%; decreasing linear trend: $P < 0.001$; 65.7%) and NONf ($P < 0.05$; 28.8%; increasing linear trend: $P < 0.05$; 50.0%) the latter emerging because the mean of the group BS++ was lower than the mean of BS+. However, the Duncan-Test indicated that this difference was not significant. Similarly, a significant quadratic effect (of an U-form shape) of ES on INC-RESf ($P < 0.01$; 19.3%; decreasing linear trend: $P < 0.001$; 65.8%) consisted of an increase of the means between the ES+ and ES++ which turned out to be insignificant in a Duncan-Test too.

Thus, generally there mainly existed strong linear relationships between sensation seeking and humour. Two analyses yielded only nonlinear relationships; however, they were not powerful. Furthermore, one also has to take into account, that deviations from linearity may occur because the means of the 5 groups in the independent variables also have not been throughout equidistant.

Sensation seeking as a factor determining the preference for types of humour

The correlations presented above suggest that ES and BS determine the relative preference for nonsense humour over INC-RES humour independent of the degree of enjoyment induced by these two categories. Thus, two Structure Preference Indices (SPI) were derived by subtracting INC-RESf from NONf (a positive score indicated that the Ss considers humour based on the nonsense structure funnier than incongruity- resolution humour) and INC-RESa from NONa (a positive score indicated that the Ss considered nonsense more aversive than INC-RES). The correlations between SPI (funniness) and SPI (aversiveness) and the sensation seeking scales were computed and are presented in Tables 4 and 5 respectively.

Table 4. Correlations between the Structure Preference Index (NONf - INC-RESf; positive score: nonsense funnier; negative score: incongruity-resolution funnier) and the sensation seeking scales computed separately for the 4 samples and combined

	TAS	DIS	ES	BS	TOTAL
sample 1	-0.19*	0.15	0.27**	0.33***	0.18
sample 2	0.10	0.23	0.50***	0.37**	0.38**
sample 3	0.12	0.15	0.31***	0.26**	0.29***
sample 4	0.09	0.32**	0.30**	0.31**	0.33***
sample 1-4	0.06	0.23***	0.40***	0.35***	0.34***

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table 5. Correlations between the Structure Preference Index (NONa - INC-RESa; positive score: nonsense more aversive; negative score: incongruity-resolution more aversive) and the sensation seeking scales computed separately for the 4 samples and combined

	TAS	DIS	ES	BS	TOTAL
sample 1	0.10	-0.08	-0.25**	-0.26**	-0.16
sample 2	0.02	0.02	-0.35**	-0.04	-0.13
sample 3	-0.06	-0.02	-0.18*	-0.24**	-0.17*
sample 4	-0.11	-0.20*	-0.15	-0.15	-0.21*
sample 1-4	-0.05	-0.11*	-0.27***	-0.24***	-0.22***

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

It can be seen that ES, BS and Total SS significantly predicted the preference for the NON structure over INC-RES structure with regard to both components of appreciation, funniness and aversiveness. In other words, sensation seeker appreciate nonsense humour more than incongruity -resolution humour, independent of the absolute degree of appreciation for these two types of humour. Surprisingly, the SPI-scores were significantly correlated and very homogeneous in size in the different samples and in the total group ($r = -0.62$, $r = -0.59$, $r = -0.57$, $r = -0.60$, and $r = -0.63$; all $P < 0.001$) although the funniness and aversiveness scores within given humour scales were uncorrelated.

Sample differences in the SS-Scales and in humour

Ss of sample three were older than the others and derived from a non-student population. Not surprisingly, they were lower in SS than the other samples in all subscales except TAS. Accordingly, they had the highest means of all groups in INC-RESf and NONa and the lowest means in NONf and INC-RESa. Despite of the fact that they scored lowest in DIS they also had the highest mean in SEXf; presumably due to their high appreciation of humour based on the incongruity-resolution structure. Thus, the joint differences between the 4 groups gives further support to the general findings of the study.

DISCUSSION

In the present study hypotheses about the role of sensation seeking in appreciation of humour were derived and tested. The main results can be summarized as follows,

(a) ES and BS predict appreciation of the structural component in humour. In detail, ES and BS correlate with funniness (positively) and aversiveness (negatively) of humour based on the nonsense structure (i.e. NON humour but also NON SEX humour) and negatively with funniness of INC-RES humour. ES and BS correlate especially high with ipsative measures (funniness and aversiveness) for preference of nonsense over incongruity-resolution humour.

(b) DIS predicts appreciation of the content component in sex humour. DIS correlates with funniness (positively) and aversiveness (negatively) of sex humour. These coefficients are very high if DIS is related to the content aspect only (with the effects of the structure being removed). Taking the structural basis into account DIS is most highly correlated with NON SEX humour (i.e. humour, in which the arousing properties of structure and content fuse); moderately with PURE SEX humour and insignificantly with INC-RES SEX humour (i.e. humour in which, for sensation seekers, dislike of structure neutralizes like of content).

(c) DIS correlates negatively with all three aversiveness scales.

(d) DIS is negatively correlated with funniness of INC-RES humour; furthermore, there are cubic effects of DIS on all three funniness scales. However, most effects of SS on humour are linear.

(e) All SS-Scales correlated negatively with aversiveness of sex humour.

How do the results of this study fit to other results obtained? Firstly, SS is related to variables which are predictive of appreciation of nonsense. The Eysenck equivalent of SS, venturesomeness, correlated positively with funniness of nonsense; so did impulsiveness and the 16PF scales surgency and parmia. Furthermore, nonsense humour was rated as aversive by Ss scoring low in venturesomeness, curiosity, psychoticism, dominance, parmia and radicalism (Hehl et al., 1985). Secondly, sociodemographic variables such as age and sex are related to SS and nonsense in a similar fashion. The life-span changes found in SS (Zuckerman, 1979) could be found for funniness of nonsense too (McGhee et al., 1987): NONf increases between 14 and 20 years, is high for two decades and declines thereafter with increasing age. Whereas generally, males score higher on SS, there are no sex differences in ES, as in funniness of nonsense. Furthermore, in a set of (unpublished) experimental studies, appreciation of nonsense was able to predict exploratory behaviour and aesthetic preferences (i.e. variables which would be predicted by SS). A study involved the use of "prism-glasses" which distorted the normal visual field by either inverting everything or reversing the right-left relationship. Ss were unobtrusively watched during a "preexperimental" warm-up period assigned to allow subjects to adapt to the glasses. Subjects yielding higher funniness ratings to nonsense humour spent more time wearing the glasses and engaged in more activities (e.g., moving objects in one's hand, moving one's head, standing up, walking, etc.) designed to produce and increase degree of novel or incongruous visual feedback. In a further study Ss rated the pleasingness of artistic postcards categorized as simple or complex and non-fantastic or fantastic. While subjects appreciating INC-RES humour found simple/non-fantastic art forms more pleasing, those who considered nonsense humour funny found complex/non-fantastic and especially complex/fantastic art forms more pleasing. When asked to design a pleasing pattern (a black/white configuration) on a board composed of squares in a 10 x 10 dimensional array with 100 black or white tiles Ss appreciating nonsense produced more complex patterns than Ss low in funniness of nonsense. Further correlations between nonsense and collative variables were found when analysing the pleasingness of polygons differing in complexity and in the preference for symmetric vs asymmetric polygons.

Our two component model for tendency humour suggests that in sex humour there are two sources of pleasure: a structure component and a content component. Tough-/tendermindedness (T) is predictive of appreciation of the content of sex jokes and cartoons regardless of their structure whereas conservatism is predictive of appreciation of the (INC-

RES) structure (Ruch et al., 1986b). Variables related to the toughmindedness complex, like Intolerance of Ambiguity, Dogmatism, Masculinity or Extraversion (and components of E) showed significant positive correlations in several studies (Hehl and Ruch, 1985; Joachim, 1986; Ruch and Hehl, 1986a, 1986b). Disinhibition, as a marker variable of toughmindedness, fits well into this model. The DIS scale contains some sex items and is usually a good predictor for sexual attitudes and behaviour (Zuckerman, 1979; Zuckerman and Litle, 1986). However, according to their location in the two-dimensional attitude space, DIS and the other predictors differ with respect to the subgroup of sex humour they best predict. DIS (located in the toughminded/liberal quadrant) correlated most highly with sex humour based on the NON structure and insignificantly with INC-RES humour whereas, for example, Intolerance of Ambiguity (located in the toughminded/conservative quadrant and thus nearly uncorrelated from DIS) is highly predictive of appreciation of sex humour based on the INC-RES structure and less predictive of NON SEX humour. There is also convergence in sex differences; males score higher than females in DIS and in SEXf and lower in SEXa.

There are hypotheses to be tested in further studies. Experimental research should be carried out in order to test whether the hypothesis that DIS is related to the intensity dimension also applies in the realm of humour. One might hypothesize, that the difference in appreciation of sex humour of Ss high and low in DIS increases with increasing tendency of the content. Furthermore, we will try to untangle the effects of novelty from the effects of other collative variables. A joke is perceived differently depending on whether he is already known or not. A repeated exposure design should permit different predictions for high and low sensation seekers, for INC-RES and NON humour and interactive effects with SS. Under conditions of repetitive presentation of the same jokes and cartoons the reaction to humour will habituate faster in the high sensation seeker than in the low sensation seeker; INC-RES humour will lose attractiveness earlier than NON humour. Punchlines of INC-RES humour will lose much of their arousal potential once the joke is understood the first time. The misinterpretation of the joke body leading to the incongruity will not occur once the joke is known. In the unsolvable and absurd incongruities of nonsense humour the discrepancy cannot be reduced even after repeated exposure. It might be, that repeated exposure allows people disliking nonsense humour to gradually approach this kind of humour and to get accustomed to it yielding into enhanced appreciation. One could expect this kind of interaction for high and low sensation seekers: high SS will very quickly habituate to INC-RES humour and less quickly to nonsense, whereas low SS will slowly habituate to INC-RES humour and accommodate to nonsense gradually leading to reduction of aversiveness and increases of funniness.

Humour does not only have arousing properties through its stimulus attributes but also through its typical reaction, smiling and laughter. Laughter is a behaviour associated with strong changes in feeling state (arousal of pleasure and joy) as well as in physiological state (e.g. increases in heart rate, secretion of tears, vasodilatation, activated catecholamine system, respiration arrhythmia, phasic and tonic changes in muscle activity), predominantly of the sympathetic nervous system. SS (and extraversion, or Strelau's strength of the nervous system) might be related to different parameters (e.g. threshold and intensity) of these altered physiological and psychological states of highly positive hedonic tone.

Although further experimental research is required, some tentative conclusions can be drawn. In summary, these findings and the experimental results cited above provide ample support for the notion that the enjoyment of different structures in humour reflect a broader disposition to seek out and enjoy events which offer varying degrees of stimulus uncertainty (unambiguous/ambiguous, predictable/unpredictable, simple/complex, consistent/varied, familiar/novel, etc.). The enjoyment of different content in humour might be reflective of a

broader disposition to seek out and enjoy different degrees of stimulus intensity. Thus, humour appreciation appears to be closely associated with and reflective of such a basic personality characteristic as sensation-seeking. In other words, humour can be regarded as another area in which sensation seekers can express their need for intense, varied, novel and complex stimulation.

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